Spatial 2D distribution and depth of sugarcane root system in a deep soil

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Sugarcane root system depth is a key parameter for water and mineral uptake but it is still very little known. Rooting depth of sugarcane (variety R570) has been determined in a deep soil in Reunion Island. In depth, it is therefore difficult to use the soil core method. Over a 1.5 m wide soil profile, roots were counted down the root front using a 5cmx5cm mesh grid to spatialize results. Data were entered into the *RACINE2* software. It calculates root length density (RLD) and from RLD, distances between roots (ARD), producing, 2D root distribution maps and depth-related RLD profiles. Below 2 m, RLD was weak but not nil, and root fronts on the 4 measurement sites were 405, 390, 400, and 325 cm deep. RLD decreases with depth from .6 to .01 cm cm^{-3} at a 2 m depth. There was a power relationship between depth and RLD. ARD values are lower than 10 cm at 2-m depth. Below 3 meters, they fluctuated between 10 and 50 cm. If roots in the soil can absorb water up to 5 cm, roots below 1.5 m may allow survival in case of drought. The study was carried out in good crop conditions, in deep soil. Findings bring new important information for Reunion Island, where it was thought that RF was less than 2 m in depth (data used in crop models). These results also contribute to a better understanding of the sugarcane root system.

Keywords: root front, Reunion Island, root length density, root distribution, root spatial variability, Sugarcane root system